MULTIMEDIA UNIVERSITY STUDENT IDENTIFICATION NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2016/2017

BDS 4614 – MANAGEMENT DECISION SCIENCE

(All sections / Groups)

29 May 2017
9.00 a.m – 12.00 p.m
(3 Hours)

INSTRUCTIONS TO STUDENT

1. This Question paper consists of 5 pages with 5 Questions only.

2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the Answer Booklet provided.

QUESTION 1

Smartcomp manufactures three products: smartphones, cameras, and tablets. The production process of these products are similar in that all require three machines: M1, M2, and M3. Each smartphone needs 4 hours in M1, 1 hour in M2, and 2 hours in M3. Each camera needs 2 hours in M1, 1 hour in M2, and 2 hours in M3. Each tablet needs 2 hours in M1, 1 hour in M2, and 4 hours in M3. During the next production cycle, 300 hours of M1, 600 hours of M2, and 400 hours of M3 are available. Each smartphone sold yields a profit of RM130. Each camera sold yields a profit of RM140. Each tablet sold yields a profit of RM150.

a. Formulate the above problem as a linear programming problem.

(4 marks)

b. Set up the initial simplex tableau for the above linear programming problem

(4 marks)

Given the following final tableau

C_j →		130	140	150	0	0	0	
	Solution Mix	X1	X2	X3	S1	S2	S3	Quantity
140	X2	3	1	0	1	0	-0.5	100
0	S2	-1	0	0	-0.5	1	0	450
150	X3	-1	0	1	-0.5	0	0.5	50
	Z_j	270	140	150	65	0	5	21500
	$C_j - Z_j$	-140	0	0	-65	0	-5	

S1 – slack for total hours available for M1
S2 – slack for total hours available for M2
S3 – slack for total hours available for M3

c. How many units of smartphone, camera, and tablet should be produced in the next production cycle in order to maximize its profit?

(4 marks)

d. What are the shadow prices of the three constraints and explain what does it mean?

(4 marks)

e. Determine the range for the right hand side of the third constraint without changing the dual price.

(4 marks)

(Total: 20 marks)

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QUESTION 2

a. Techome, a furniture company produces chairs at factories in Melaka, Perak, and Selangor. These chairs are sent to warehouses in Kuala Lumpur, Johor, and Pahang. Techome would like to determine the minimum cost to meet the demand at each warehouse. The shipping cost per chair from each of the factories to each of the warehouses, the supply from each factory, and demand at each warehouse are shown in the following table. How many chairs should be shipped from each factory to each warehouse? What is the minimum cost for this?

Factory	**Warehouse**			
	Kuala Lumpur	Johor	Pahang	**Supply**
Melaka	5	8	10	120
Perak	6	7	9	200
Selangor	3	6	8	160
Demand	140	160	180	480

(10 marks)

b. The owner of Techome is considering to assign four new tasks to four employees. The hours required for each employee to complete the tasks are presented in the following table. Determine the optimal assignment and compute the minimum time.

Task	**Employee**			
	Jane	Tom	James	Danny
A	5	7	8	7
B	6	6	7	5
C	5	6	6	5
D	7	8	9	8

(10 marks)
(Total: 20 marks)

Continued...

QUESTION 3

Carmen is the owner of ABC fast food restaurant which provides delivery service. She is now managing a program that customers can use to make order. The information of the activities involved is shown in the following table:

Activity	Seconds			Immediate Predecessors
	a	*m*	*b*	
A	9	11	13	-
B	7	8	9	-
C	4	5	6	-
D	11	21	31	A
E	7	8	9	C
F	10	11	12	B, D, E
G	7	9	11	B, D, E
H	15	16	17	F
I	10	12	14	F
J	7	8	9	G, H, I

a. Construct a network diagram for this problem.

(8 marks)

b. Determine the expected time, earliest start time, latest start time, earliest finish time, latest finish time and slack time for each activity.

(10 marks)

c. Determine the critical path and project completion time.

(2 marks)

(Total: 20 marks)

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QUESTION 4

Hitech sells a popular computer component which has an annual demand of 1000 units. The cost of each component is RM5. Carrying cost is estimated to be 10% of the unit cost and the ordering cost is RM50 per order. The lead time between orders is 3 days and Hitech works 6 days per week and 52 weeks per year.

a. Determine the economic order quantity.

(3 marks)

b. How many orders per year would be placed?

(1 mark)

c. What is the reorder point?

(2 marks)

d. What is the total cost?

(3 marks)

e. If Hitech orders in quantities of 500 units or more, it can get a 10% discount on the cost of the component. Should Hitech take the discount?

(11 marks)

(Total: 20 marks)

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QUESTION 5

a. Ken is planning to open a restaurant in Bukit Beruang, nearby Multimedia University. His options are to open an eastern food restaurant or a western food restaurant. Of course, Ken can always do nothing and not open any restaurant. The market for his restaurant may be good or poor. The net profit or loss for the eastern food restaurant and western food restaurant for various market conditions are presented in the following table.

Alternative	Annual Return	
	Good Market	**Poor Market**
Eastern food restaurant	RM100,000	-RM20,000
Western food restaurant	RM160,000	-RM40,000
Do nothing	0	0

i. What type of decision is Ken facing?

(1 mark)

ii. If Ken is a pessimistic person, what would you recommend to Ken?

(2 marks)

iii. What is the best decision using criterion of realism? (α=0.7)

(3 marks)

b. Without gathering additional information, Ken estimates that the probability of a good market is 0.45. If Ken conducts a market survey, the results could be favourable or unfavourable but it would cost him RM5000 to conduct the survey. It is estimated that there is a 0.6 chance that the result will be favourable. If the survey result is favourable, the probability of a good market is 0.6. If the survey result is unfavourable, the probability of a good market is 0.35. Draw a decision tree for this problem. What would you recommend?

(14 marks)
(Total: 20 marks)

End of Paper